

SUMMARY OF ILLNESSES AND INJURIES DUE TO  
OCCUPATIONAL EXPOSURE TO PESTICIDES OF  
GROUND APPLICATORS REPORTED BY PHYSICIANS  
IN 1982

By

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SUMMARY

There were 160 cases of occupational illness and injury due to exposure to pesticides reported for ground applicators in 1982. This group of workers involves those who apply dusts or sprays by application equipment mounted on vehicles operating on the ground, plus those individuals who perform tasks ancillary to these applications. Of the 160 cases reported, there were 75 systemic illnesses, 37 eye injuries, 46 skin injuries, and 2 eye and skin injuries. When these same 160 incidents were examined for their pesticide exposure/illness relationship, 32 were found to be "Unlikely," 50 were judged "Possible", 40 were found to be "Probable", and 38 were "Definite".

The pesticide chemicals dinitrophenol, glyphosate, paraquat, and propargite were associated with 41 percent of injuries where the identity of the pesticide was reported. Parathion was responsible for the greatest number of systemic illnesses. Propargite was responsible for the most eye and the most skin injuries, as well as being the pesticide most often reported to cause any kind of illnesses or injury to ground applicators. Exposures in this work category alone resulted in 42 estimated days of hospitalization and 216 estimated days of disability.

## INTRODUCTION

Under Section 2950 of the California Health and Safety Code, each injury or illness that occurs in the State and may potentially be pesticide-related is required to be reported by the attending physician to the local county health department within 24 hours. In turn, county health officials must report the incident to the local county agricultural commissioner, the State Department of Food and Agriculture, and the State Department of Health Services. The incident is then investigated by the local county agricultural commissioners' staff and the resulting report is submitted to the California Department of Food and Agriculture's (CDFA) Worker Health and Safety Unit for evaluation and classification.

Based on input from State and county agencies, physicians, and available toxicological and medical data, the Worker Health and Safety Unit evaluates each pesticide-related incident and places it within a system of classification based on work activity and illness type. Each incident is classified according to the circumstances of exposure and the reported signs and symptoms of disease. Classifications used are "Definite", "Probable", "Possible", and "Unlikely".

In the calendar year 1982, there were 2,522 incidents reported by physicians as potentially pesticide-related illnesses or injuries. Of these, 1,334 had adequate information and were judged to have some degree of likelihood to be both occupationally and pesticide-related. The remainder had inadequate information, were nonoccupational exposures, or were determined, after investigation, not to be pesticide exposure-related.

One hundred sixty of these 1,334 incidents reported by California physicians as potentially pesticide-related were assigned to the "Ground Applicator" classification. Incidents assigned to this work activity classification are those affecting individuals who apply pesticides to agricultural fields using vehicle-borne application equipment. Seventy-five of the 160 reported illnesses and injuries were systemic illnesses, which are generally considered more serious than topical injuries. The remainder were classified as topical injuries with 37 affecting the eye, 46 affecting the skin, and 2 affecting both eye and skin. There were no pesticide-related deaths of ground applicators reported in California in 1982.

When examining these same 160 illnesses and injuries for their relationship to pesticides, 32 were found to have an "Unlikely", 50 were determined to have a "Possible", 40 were judged to have a "Probable", and 38 were determined to have a "Definite" exposure/symptom relationship.

The accompanying discussion is followed by tables reporting illness types and their pesticide relationship (Table 1), causal pesticides (Table 2), and crops associated with pesticide illnesses for ground applicators (Table 3). Information on general pesticide illness statistics for 1982 can be found in HS-1098. Other work activity categories are related in their respective "HS" reports.

## DISCUSSION

Thirty-two episodes of ground applicator illness or injury were judged to have an "Unlikely" relationship to pesticide exposure due to an absence of confirmatory evidence required to place the incident in a more positive category. Six of these cases were skin injuries, while 26 were cases of systemic illness.

In two of these "Unlikely" cases, no significant pesticide exposure had actually occurred, leading investigators to the conclusion that a pesticide illness was probably not involved. In both cases, the applicator reportedly wore protective clothing and in one, the individual was working in a closed-cab tractor. This latter incident reportedly resulted in two days lost from work.

Eight of these same 32 "Unlikely" incidents involved symptoms that were either incompatible with pesticide intoxication or developed so long after the possible exposure that pesticide exposure could not be definitely related to the illness. In one instance, an applicator reported symptoms six weeks after he had last worked with pesticides. In two separate cases, rashes were reported to develop two weeks and one week after last using pesticides, which is not normally consistent with contact dermatitis. A total of three days work were lost from these eight incidents.

The remaining 22 cases in the "Unlikely" classification may also be attributed to causes other than pesticides. Influenza or gastritis was reportedly responsible for eight cases, while three could be related to colds or episodes of bronchitis. Two episodes were actually the result of allergies and three were attributed to hypertension. One incident could be traced to ulcers and another to a "hangover" from drinking alcohol the night before. One case was attributed to Bel's Palsey, an infection of the sinuses and middle ear. The remaining three cases could not be given a specific cause, but were suspected to be symptoms of something other than pesticide illness. The incident of Bel's Palsey resulted in 20 days lost from work. One of the incidents attributed to hypertension involved four days of hospitalization and four days lost from work.

Of the four specific classifications of illness or injury types, systemic illnesses are almost always the most serious. For 1982, there were 75 reported incidents of pesticide-related systemic illnesses, 26 of which were judged unlikely to be pesticide-related and have been discussed previously. The remaining 49 had stronger pesticide/illness relationships.

The most life-threatening episode reported involved the systemic illness of a worker who was applying parathion to oranges while reportedly drinking alcohol and working at night. After completing his work, the applicator was again drinking, when he became violently ill. He was rushed by his wife to the emergency room of a nearby hospital where he was reported to have been devoid of vital signs. After considerable effort by the emergency room staff, the worker's life functions were restored. Atropine and 2-PAM were administered antidotally. In this incident, investigation by State and

county officials discovered a higher than normal application rate, poor worker safety procedures, and poor recording and reporting of training and application records. It was also noted that he had been drinking heavily. It is also possible that, by accident, he may have mistakenly ingested some parathion.

In another incident, three persons developed systemic symptoms while "watering in" Vapam following a soil injection rig. They were employed by a municipal utility. While the individuals who worked ahead of them in the immediate application area were supplied with respiratory protection, these three employees were not given respirators and goggles until they protested. One of these individuals complained of chest discomfort for two weeks after the incident.

There were several incidents of systemic illness in which high winds were blamed for the ground applicator's exposure. In one case, the applicator was surrounded by a whirlwind which was said to have concentrated the pesticide in his area. Another applicator blamed the stillness of the air for his exposure. He complained that when he began spraying Guthion, it spread in all directions engulfing him. After making one pass through the orchard he was treating, his clothes were soaking wet from the spray that hung in the air. Within a few hours, he experienced nausea and stomach cramps, so he quit spraying and left to see a doctor. He did not take time off from work to recuperate.

Several other reasons were given as causes for exposure incidents high enough to result in systemic illnesses. One such reason was the failure to wear an approved respirator when the pesticide label required one. In only 24 of the 75 systemic cases were respirators worn. In the remaining 51 cases, either no respirators were worn, or it was not reported if a respirator was used. In at least 38 of these cases respiratory protection would have been required by label directions.

Of the 49 systemic illnesses having the more positive relationships to pesticide exposure, the most common causes for exposure were not wearing all the required protective clothing and equipment or using the wrong equipment altogether. Twenty systemic illnesses resulted from this carelessness. Two other common causes were the use of respiratory protection equipment that did not fit well (four cases), or was previously contaminated (one case). One individual became ill when he was exposed to the contaminated equipment he used while mixing/loading. He kept this equipment in the open, inside his closed-cab tractor; thus, he was exposed to the vapor. In four cases poor personal hygiene was responsible, resulting from not washing before eating, drinking, or smoking after using pesticides. In three cases, exposure resulted from equipment failure or malfunction. In one of these cases, a hose broke, and in two, back-pressure caused pesticides to be sprayed when they were not expected. Eight of the remaining 17 cases resulted in an unknown fashion even though protective equipment was reportedly worn. In the final nine systemic cases, the mode of exposure could not be determined.

There were 46 incidents of skin injury reported for ground applicators in 1982 including 16 classified as "Possible", 16 "Probable", 8 "Definite",

and 6 "Unlikely". Fifteen of these incidents involved Toxicity Category I pesticides, 10 involved Category II's, another 11 involved Category III's, and in 10 cases, the causal pesticide was not reported. Pesticides that were responsible in more than one case included various formulations of propargite, dusting sulfur, and the herbicides dinoseb and glyphosate. Skin injuries that were reported were described as rashes, contact dermatitis, or chemical burns. In five of these 46 cases of skin injury, protective clothing or equipment was not being used. In many cases, either protective equipment was not a label requirement or the equipment was removed to do repair work, often resulting in rashes or chemical burns to the hands or face. In 25 cases, protective clothing or equipment was reportedly being used, but skin injury still occurred. The most common injury locations were the face/neck area and the region of the arms and hands with several cases each. In the remaining cases, injury occurred to the body or legs.

An unusual case of skin injury seen in 1982 occurred in Madera County. An applicator using sulfur and wearing coveralls over his own clothing developed a rash over most of his body and lost three days from work when his coveralls became wet from rain. This allowed contact between his skin and his sulfur-impregnated coveralls and clothing. The rash resulted even though he showered after work.

Thirty-seven incidents of eye injury for ground applicators were reported in 1982. Of these, 18 were "Definite", 8 were "Probable", and 11 were classified as "Possible". Like skin injuries, the pesticide-cause relationship is less difficult to establish in this illness category since actual signs of injury can be observed.

There were two serious incidents of eye injury this year that resulted in several days lost from work. In the first, an applicator was spraying weeds with paraquat when the hose attached to his spray rig failed, spraying him in the eyes and mouth. The applicator was wearing no protective equipment while using this Category I material as none was supplied by his employer. Although three months were reported as lost from work in this incident, the examining physician had originally estimated up to four days would be required for the eye injury. The remainder, although under dispute since this injury was not classified as systemic, was attributed to systemic effects caused by the paraquat sprayed inside the applicator's mouth. The second incident involved diluted lindane, a Toxicity Category II material. An applicator, who was not wearing goggles or a face-shield, was rolling up a spray hose at the finish of his application when the pesticide was forced from the nozzle, spraying into his eyes. The applicator lost three days from work.

Of the 37 eye injuries reported in 1982, 13 were due to Category I pesticides, 6 were due to Category II's, 8 involved Category III's, and in the remaining 10 incidents, a specific causal pesticide could not be determined. In 7 cases injury resulted even though eye protection was reportedly worn, while in 17 cases there was no eye protection used.

There were only two cases of combined eye and skin injury to ground applicators in 1982, resulting in a total of six days of disability but no hospitalization. One applicator developed irritated eyes and chemical dermatitis while dusting grapes with sulfur at night, resulting in two days

lost from work. A more serious case of eye and skin injury was to an applicator using the Toxicity Category II pesticide Plictran. Even though this individual was wearing goggles, wiping his forehead with a contaminated hankerchief resulted in severe chemical conjunctivitis. He also experienced contact dermatitis even though coveralls were worn. This individual lost four days from work on doctor's orders. Both of these incidents of eye and skin injury were classified as definitely pesticide-related.

#### CONCLUSIONS

Illnesses and injuries to ground applicators occur primarily at the time of the initial pesticide application so that the employment of better protective measures including the provision of better information, education, and supervision might reduce the number of cases seen each year. It is recognized that some of the most effective pesticides are also some of the most toxic to the humans that use them. Even so, the use of chemicals of lower toxicity to humans should be encouraged whenever feasible. In addition, study of the reported incidents for 1982 reveals that a few employers need to give more attention to the use of proper protective clothing and equipment. Poorly fitting respirators that allow pesticide fumes and vapors to bypass the filters, loose goggles, and improperly worn face-shields that allow splashed or sprayed material to reach the eyes, and improperly sized coveralls, gloves, and boots that allow skin injury at the wrist, the nape of the neck, and the lower leg need attention. Perhaps the least expensive and quickest way to reduce applicator injury is to improve training of workers in safe work practices and proper personal hygiene. Ultimately, each individual who works with pesticides must also take considerable responsibility for him or herself to comply with the safe-use information provided and available.

Table 1 - Types of Illnesses and Injuries Reported in 1982 for "Ground Applicators" Showing Their Pesticide Illness Relationship

Illness Type	Unlikely	Possible	Probable	Definite	Total Cases
Systemic	26	23	16	10	75
Eye	0	11	8	18	37
Skin	6	16	16	8	46
Eye and Skin	0	0	0	2	2
Deaths	0	0	0	0	0
Total Cases	32	50	40	38	160

Table 2 - Pesticides Responsible for Ground Applicator Illnesses  
and Injuries for 1982 According to Illness Type

	Systemic	Eye	Skin	Eye/Skin	Total
2,4-D	0	0	1	0	1
Acephate	1	0	0	0	1
Aldicarb	4	0	0	0	4
Amitrole	0	0	1	0	1
Azinphos-methyl	2	0	0	0	2
Bayleton	0	0	1	0	1
Benomyl	1	0	0	0	1
Carbaryl	1	0	0	0	1
Chlorothalonil	0	0	1	0	1
Copper Hydroxide	0	0	1	0	1
Cycloheximide	1	0	0	0	1
Cyhexatin	0	0	2	1	3
DEF	1	0	0	0	1
Diazinon	1	0	0	0	1
Dimethoate	1	0	0	0	1
Dinitrophenol	3	3	6	0	12
Diphenamid	1	0	0	0	1
Dyfonate	1	0	0	0	1
Ethazole	1	0	0	0	1
Ethylene Dibromide	0	0	1	0	1
Glyphosate	4	3	4	0	11
Imidan	1	1	0	0	2
Lindane	0	1	0	0	1
Malathion	1	0	0	0	1
Methidathion	1	1	0	0	2
Methomyl	3	0	0	0	3
Methyl Parathion	1	0	0	0	1
Mevinphos	2	0	0	0	2
Oxamyl	2	0	0	0	2
Paraquat	6	4	1	0	11
Parathion	7	0	1	0	8
Pebulate	1	0	0	0	1
Phorate	1	0	0	0	1
Phosalone	1	0	0	0	1
Prometryn	1	1	0	0	2
Propargite	0	6	10	0	16
Prowl	0	0	1	0	1
Sulfur	0	3	5	1	9
Telone II	1	1	1	0	3
Thiram	0	0	1	0	1
Trifluralin	0	0	1	0	1
Vapan	3	0	0	0	3
Weed Oil	2	0	0	0	2
Not Determined	<u>18</u>	<u>13</u>	<u>7</u>	<u>0</u>	<u>38</u>
Total	75	37	46	2	160



Table 3 - Crops Associated With Illnesses and Injuries to  
Ground Applicators in 1982

Alfalfa	2
Almonds	15
Apricots	1
Celery	2
Citrus, All	8
Corn	1
Cotton	12
Cucumber	1
Grapes	32
Greenhouse	1
Ground Cover	1
Lettuce	1
Noncrop	1
Nursery Stock	1
Ornamentals	1
Peaches	4
Pears	1
Prunes	1
Soil	4
Strawberries	3
Sugar Beets	1
Tomatoes	5
Walnuts	5
Weeds	6
Not Specified	<u>50</u>
Total	160